

Application No. 10/736,044
Reply to Office Action of September 22, 2005

Amendments to the Drawings:

The attached formal drawing sheets for Figs. 4 and 14 replace the original sheets of formal drawings for Figs. 4 and 14.

Fig. 4: Add a label “(TEMPERATURE DETECTING SENSOR)” next to box 88.

Add a label “(CONTROL CIRCUIT)” next to box 61.

Add a label “(TEMPERATURE DETECTION MEASURING CIRCUIT)” next to box 89.

Fig. 14: Add a label “(TEMPERATURE DETECTING SENSOR)” next to box 88.

Add a label “(TEMPERATURE DETECTION MEASURING CIRCUIT)” next to box 89.

Attachment: Replacement Drawing Sheet (2 sheets)

REMARKS

Claims 1-16, 19-20 and 24-42 are pending. Claim 1 was amended to incorporate the subject matter of claims 17 and 18 therein. Claim 2 was amended solely to improve its form. Claims 17-18 and 21-23 were canceled. Claims 24-42 were added to further define the present invention. No new matter was added. All of the limitations in the new claims are fully supported by the original specification. The limitations directed to the location of the temperature sensor are supported by at least Figs. 1 and 39, and page 23, line 10 through page 24, line 4 of the present specification.

Title Objection

The Title was amended to be more descriptive. Accordingly, withdrawal of the title objection is respectfully requested.

Disclosure Objection

The disclosure was objected to because of the word "suck" and permutations thereof. In response, the specification was amended as requested by the Examiner to replace all instances and permutations of "suck" with instances and permutations of "attract."

Drawing Objections

The Examiner objected to Figs. 4 and 14 because they contained some unlabeled boxes. Figs. 4 and 14 were amended to include labels for the originally unlabeled boxes. Accordingly, withdrawal of the drawing objections are respectfully requested.

Prior Art Rejections

Claims 1, 2 and 21 were rejected under 35 U.S.C. § 102(b), as allegedly being anticipated by JP 09-171275 (Nakayama).

Claims 21 and 23 were rejected under 35 U.S.C. § 102(b), as allegedly being anticipated by U.S. Patent No. 5,907,741 (Matsuzawa et al.).

Claims 21 and 22 were rejected under 35 U.S.C. § 102(b), as allegedly being anticipated by JP 04-21870 (Kato).

Claims 3, 17 and 19 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Nakayama in view of U.S. Patent No. 6,694,108 (Hirose et al.).

Claim 16 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Nakayama in view of U.S. Patent No. 5,844,694 (Miura).

Claim 18 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Nakayama in view of JP 2000-347531 (Fujiwara).

Applicants respectfully requests withdrawal of all of these rejections as they pertain to the amended claims for at least the reasons set forth below.

1. Present Invention

One preferred embodiment of the present invention detects the surface temperature of conveying belt 20, and uses the detected temperature as an approximate indicator of the temperature of the photosensitive drum. The conveying speed of a print medium and the control temperature of a fixing unit are then controlled based on the temperature. In this manner, it is not necessary to detect the temperature of the photosensitive drum which can be difficult to measure. See, page 21, line 7 through page 23, line 2 of the present specification.

2. Nakayama

Nakayama discloses measuring the temperature of an intermediate transfer belt 71 or the temperature of a part whose temperature has correlation with the temperature of the intermediate

transfer belt 71, and then using the temperature to control the timing of writing a latent image onto a latent image carrier. Nakayama recognizes that the expansion and contraction of the intermediate transfer belt 71 may cause positional errors that result in image quality problems such as color slurring. Nakayama addresses this problem by measuring the belt temperature and using the measured temperature to control the timing of writing a latent image onto a latent image carrier. Nakayama does not disclose or suggest that the temperature of the intermediate transfer belt 71 can be used to control the conveying speed of a print medium or the control temperature of a fixing unit.

3. Fujiwara

Fujiwara discloses measuring the temperature in an area that is inside of an image forming main body separated from a fixing roller, and then using the measured temperature to control a heater inside of a fixing roller. Fujiwara does not disclose or suggest measuring the temperature of a conveying belt, and then using the measured temperature to control the conveying speed of a print medium or the control temperature of a fixing unit.

4. Hirose

Hirose discloses measuring the temperature disposed near a developing device or electrophotographic photosensitive member (column 4, lines 8-9 and column 11, lines 39-40) and then using the measured temperature to control printing speed (i.e., number of image forming sheets per unit time). Hirose does not disclose or suggest measuring the temperature of a conveying belt, and then using the measured temperature to control the conveying speed of a print medium or the control temperature of a fixing unit.

5. Patentability of amended claim 1 over the Nakayama in view of Hirose¹ and Fujiwara

Amended claim 1 now incorporates the limitations of claims 17 and 18, and now reads as

¹ Claim 18 was rejected over Nakayama in view of only Fujiwara. However, since claim 18 depends from claim 17, the rejection should have been based on Nakayama in view of Hirose and Fujiwara.

follows:

An image forming apparatus comprising:

(a) an image forming unit which forms an electrostatic latent image onto a charged image holding material, deposits a developing material onto said electrostatic latent image, and forms a visible image;

(b) a belt arranged so as to run freely in contact with said image forming unit;

(c) a temperature detecting unit which detects a temperature of said belt; and

(d) a control unit which controls an image forming process on the basis of the temperature detected by said temperature detecting unit, wherein the control unit

(i) reduces a conveying speed of a print medium when the temperature detected by the temperature detecting unit is higher than a threshold value, and

(ii) lowers a control temperature of a fixing unit when the temperature detected by the temperature detecting unit is higher than a threshold value.

Claim 1 recites a specific combination of elements that detect a temperature of a belt, and then use the detected temperature to control conveying speed and the fixing unit temperature. None of the applied references disclose this specific combination of elements. Nakayama detects the temperature of a belt, but uses it for a completely different reason, namely, to control timing of an image forming process. Fujiwara and Hirose measure temperature in other parts of an image forming apparatus (i.e., not the belt) to control processes similar to the claimed processes.

None of the applied references recognize that the temperature of a belt can be used as an indicator of the temperature of the photosensitive drum, thereby avoiding the need to detect the temperature of the photosensitive drum which can be difficult to measure. Thus, while the applied references individually disclose elements of amended claim 1 (e.g., detecting the temperature of a belt, controlling conveying speed based on a temperature measurement, controlling fixing unit temperature based on a temperature

measurement), the references do not disclose or suggest the specific combination of elements.

At best, the combination of Nakayama, Hirose and Fujiwara would only disclose using belt temperature to control timing operations, while using other types of temperature measurements (i.e., not the belt temperature) to control fixing unit and conveying speed temperature. Nakayama is fully compatible with Hirose and Fujiwara when combined in this manner. However, it would be impermissible hindsight reconstruction of Applicants' invention to extend Nakayama's disclosure of using belt temperature for timing control to using belt temperature for other types of control processes that were not contemplated by Nakayama. Likewise, it would be improper to destroy the intended manner of operation of Hirose and Fujiwara by changing the type of temperature value used to control printing speed (Hirose) or the temperature of a heater inside of a fixing roller (Fujiwara) from the temperature parameters disclosed in these references to a belt temperature measured in Nakayama. Accordingly, no possible combination of these references disclose or suggest the invention in amended claim 1.

6. Patentability of new claim 24

Claim 24 reads as follows (underlining added for emphasis):

24. An image forming apparatus comprising:
- (a) an image forming section including at least one photosensitive drum that forms an image on a recording medium;
 - (b) a fixing unit that fixes the image on the recording medium;
 - (c) a conveying belt that conveys the recording medium;
 - (d) a driving roller that drives the conveying belt, the driving roller being located between the image forming section and the fixing unit;
 - (e) a temperature sensor that detects a temperature of the photosensitive drum, the temperature sensor being placed near the driving roller; and
 - (f) a control unit that controls an image forming process on the basis of the detected temperature.

In two preferred embodiments of the present invention, namely, Figs. 1 and 39, the temperature detecting sensor 88 is placed near the driving roller 31. Page 23, line 10 through page 24, line 4 of the present specification describes that the temperature of the photosensitive drum 16C can be detected using the temperature detecting sensor 88, even though the temperature detecting sensor 88 is not physically disposed in or on the photosensitive drum 16C.

None of the prior art of record discloses or suggests the specific combination of elements set forth in claim 24.

7. Patentability of dependent claims

The dependent claims are believed to be allowable because they depend upon respective allowable independent claims, and because they recite additional patentable limitations. Also, none of the other applied references (e.g., Miura, Matsuzawa, Kato) make up for the above-highlighted deficiencies in Nakayama, Hirose and Fujiwara.

Conclusion

Insofar as the Examiner's rejections were fully addressed, the instant application is in condition for allowance. Issuance of a Notice of Allowability of all pending claims is therefore earnestly solicited.

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Respectfully submitted,

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March 15, 2006 By: Clark Jablon
(Date)

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Enclosure: Drawing Replacement Sheets (2 sheets)